



a forest industry

at Port Alberni



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a forest industry

at Port Alberni

by Arthur J. Welsh

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*A typical logging scene in the
Tofino-Alberni forest of Van-
couver Island, British Columbia.*



DO

1. How would you describe the land-form shown in this photograph?
2. What is the vegetation?
3. What do you think the long, thin, polelike objects are for?
4. How do you suppose the logs are assembled and carried away?
5. Why would it be important to clear all loose material from the site once the logs had been removed?

Logging

In the woods

The sharp teeth of Ray Brown's 26-pound chain saw bite into the trunk of the Douglas fir tree. On a quiet day the saw may be heard over the forests surrounding the Alberni Canal. But it is not a quiet day. Many other fallers like Ray Brown are cutting down trees in the region.

In order to fall the tree, Ray first makes two cuts to remove a wedge-shaped section called the *undercut*.

Take a piece of paper and draw two vertical lines representing the trunk of a tree. Indicate the undercut. Show where you think Ray's next cut will be made. In which direction will the tree fall? Why does Ray have to be careful about the direction in which the tree falls?

As the third cut comes nearer the undercut, Ray can see that the tree is going to fall in the correct direction. He checks to see where his partner, Al Fenson, is standing. The two men work together in an area, each falling his own trees. Sure that Al is in a safe position, Ray finishes the cut, pulls his saw from the tree, and moves some twenty feet away.

The 200-foot tree hits the ground with a dull, earth-shaking thud. Ray now *bucks* the tree, that is, cuts it into logs. He must decide how the tree is to be cut into suitable lengths for the processing mills without wasting valuable wood.

FOREST INDUSTRY 3

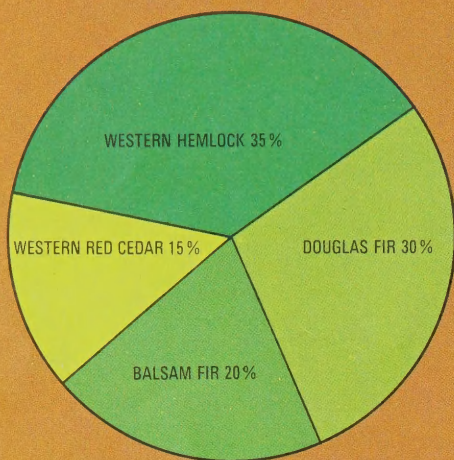


What cut has just been made in this tree? What is the faller doing now? How is the faller's chain saw powered? How thick is the trunk of the tree? Why does the faller cut the Douglas fir close to the ground?

What season of the year is it? What safety measures has this buckner taken?



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Most of the trees in the Tofino-Alberni forest are conifers, that is, cone-bearing trees. Those most important to the forest industry are the Douglas fir, the western hemlock, the balsam fir, and the red cedar. This graph shows the approximate percentage of each species found in the Tofino-Alberni forest.

The Douglas fir is one of the larger trees native to Canada. It grows as high as 300 feet with a trunk diameter from 3 to 15 feet. Because of its great strength, Douglas fir is used for plywood, siding, flooring, railway ties, poles and pilings, and construction lumber.

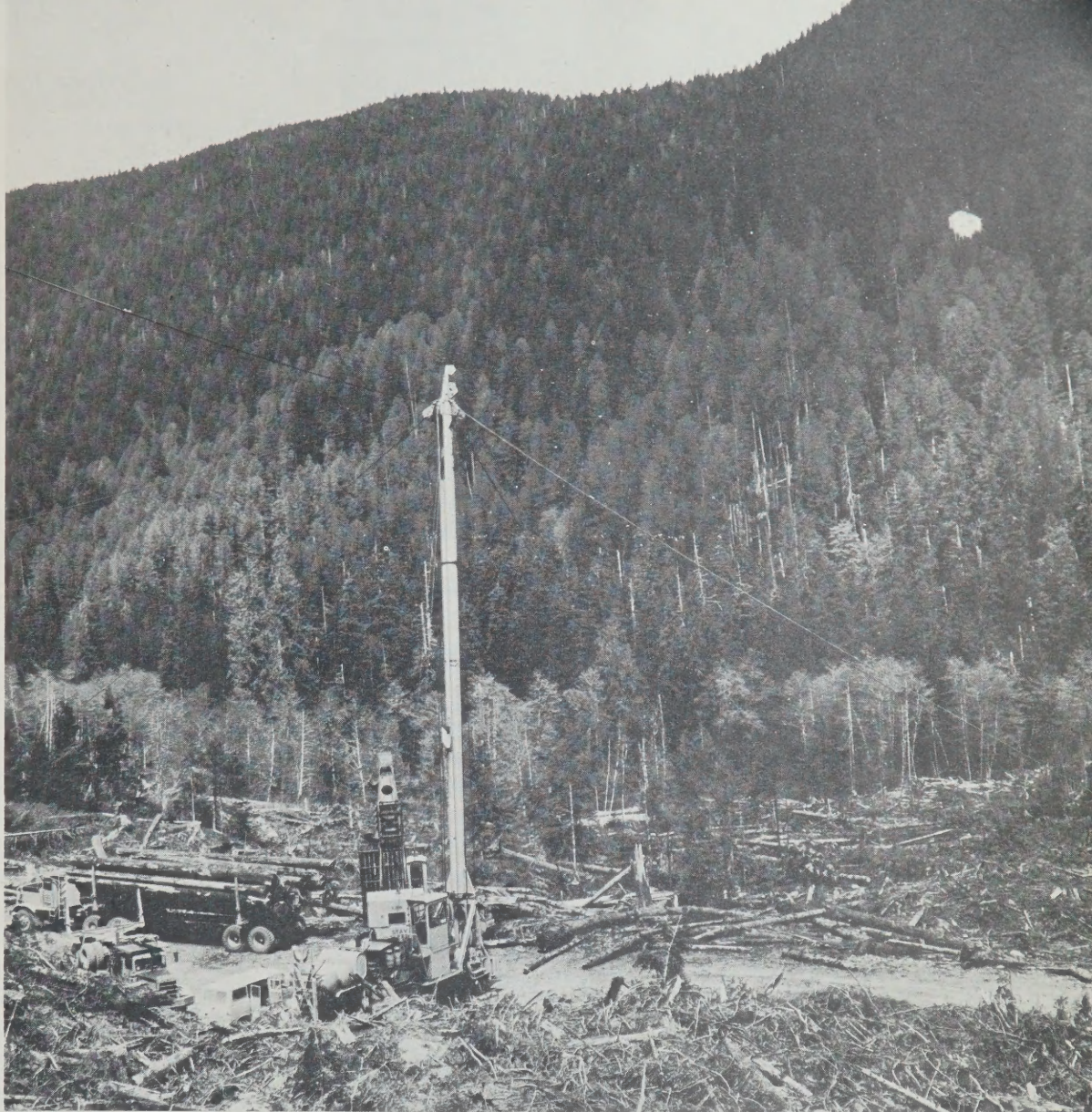
Western hemlock is a large tree, frequently 120 to 200 feet in height and 3 to 4 feet in diameter. It is the most valuable source of pulpwood, the ingredient used mainly in the manufacture of newsprint paper.

Balsam fir is a smaller tree growing to a height of 150 feet with a trunk diameter of 1½ to 3 feet. Balsam fir frequently grows alongside hemlock, and the two trees are logged together as *HemBal*. It is a good source of pulp for newsprint and is also valuable for lumber.

Western red cedar frequently reaches heights of 150 to 200 feet and diameters of 8 feet or more. It is one of the oldest trees in the Pacific region, and specimens up to 1500 years of age have been recorded. Western red cedar is excellent for use where weather resistance is important, for its wood resists rotting.

DO

1. Look for pictures of each of these four trees. Make sketches or notes to show their different leaves and bark formations.
2. Find out how a tree grows. Make a drawing to show how the age of a tree can be determined.
3. Make a collection of kinds of wood that grow near your home. Try to show a piece of the wood, some of the bark, and a leaf. State what use is made of the wood.



When Ray and Al have completed their work, they go on to another location, and a new group of forest workers moves into the area of felled and bucked timber.

Now the logs must be *yarded* or dragged to a central point for loading on to trucks. To do this, a mobile steel *spar* is set up in a level clearing. Steel cables attached to the top of the spar, and power-operated by the

The spar is yarding logs from the area in the right foreground. The loader, to the immediate left of the spar, is picking up the logs with a grapple and piling them on the logging truck. In the left foreground, another logging truck waits for a load. Notice that its trailer has been hoisted up on the back of the truck. When ready to load logs, the trailer will be lifted off into position by the loader, and attached to the truck.



These men are setting the "chokers" on logs that are to be hauled by portable spar.

vehicle on which the spar is mounted, haul the logs to the foot of the spar. Various types of loaders are then used to lift the logs and place them on the waiting trucks.

When the logs have all been loaded, the steel spar is lowered until it rests on a cradle on top of the supporting vehicle, which then moves on to another location.

A steady stream of huge trucks, some capable of carrying up to 130 tons, goes back and forth from the logging area to Shoemaker Bay, a calm, protected body of water on Alberni Inlet. Across the inlet at Port Alberni are the pulp and paper, the plywood, and the lumber mills of one of the world's largest forest products industries.



A log is lowered onto a logging truck. What is the man doing?

This loader has been given a longer reach with a "snorkel." For hauling logs a short distance, this loader can be used without a portable spar.



DO

1. Explain the use of the following terms: *faller, buck, spar, yarding, choker, logging truck.*
2. If you were in charge of a crew of fallers, what factors would you consider in choosing a new site for cutting?
3. Modern methods of logging require

fewer men to work in the forests than formerly, though more men are engaged in the industry as a whole. Approximately 850 men produce the logs that keep 3000 employees busy in the Port Alberni forest industry plants. What factors have been responsible for the greater productivity of loggers?

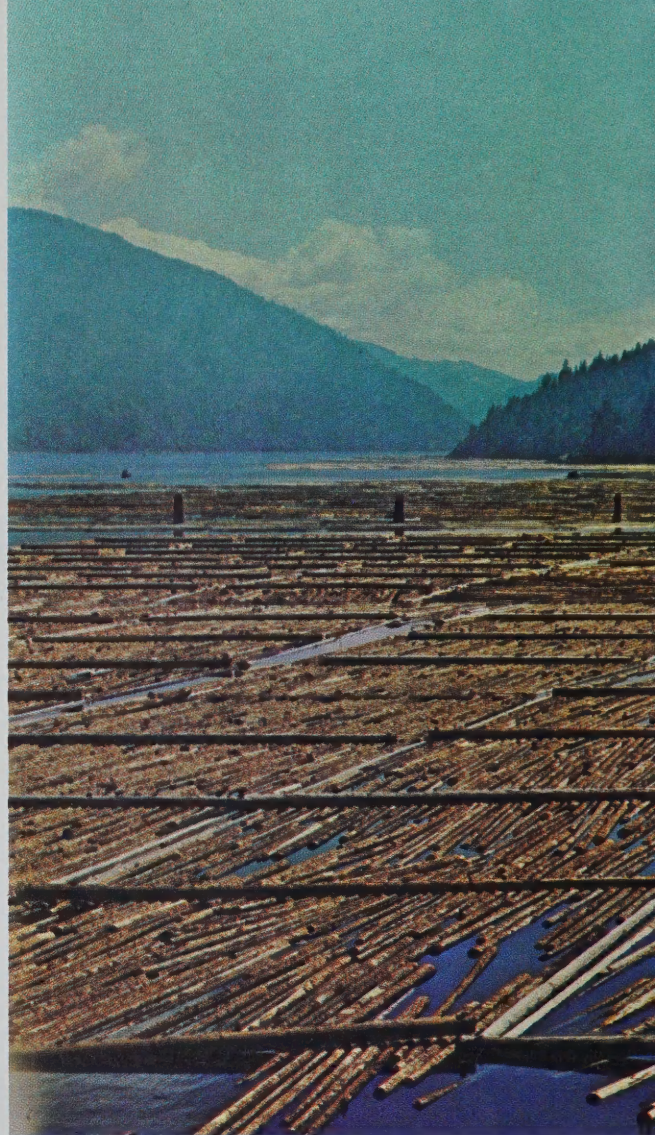
What kind of road has been cut through this forest? Can you suggest why logging trucks have largely replaced the railway in transporting logs?





These logs are being dumped from the logging truck into booming grounds.

Some logs are brought to the Alberni Inlet in self-dumping barges. To discharge the logs at the sorting grounds, large tanks on one side of the craft are flooded, thus tilting the barge and allowing the logs to slide into the water. What advantages have log barges in transporting logs over long distances?



In the water

Once in the *booming grounds*, the logs are gathered into booms, or rafts, which are pulled by tugs to the company's sorting grounds about three and a half miles toward the mouth of the inlet.

At the sorting grounds, the logs are separated according to species, size, and quality. High grade logs of Douglas fir that



Log booms in Alberni Inlet. What has been done to keep the logs from drifting apart?

are straight and free from knots, rot, and splits, go to the plywood plant. The next grade of fir and all the suitable HemBal go to the sawmill to be made into lumber. Low grade logs of various kinds and waste wood from the sawmill and plywood plants are processed in the pulp and paper mill. The shingle mill uses mature cedar logs.

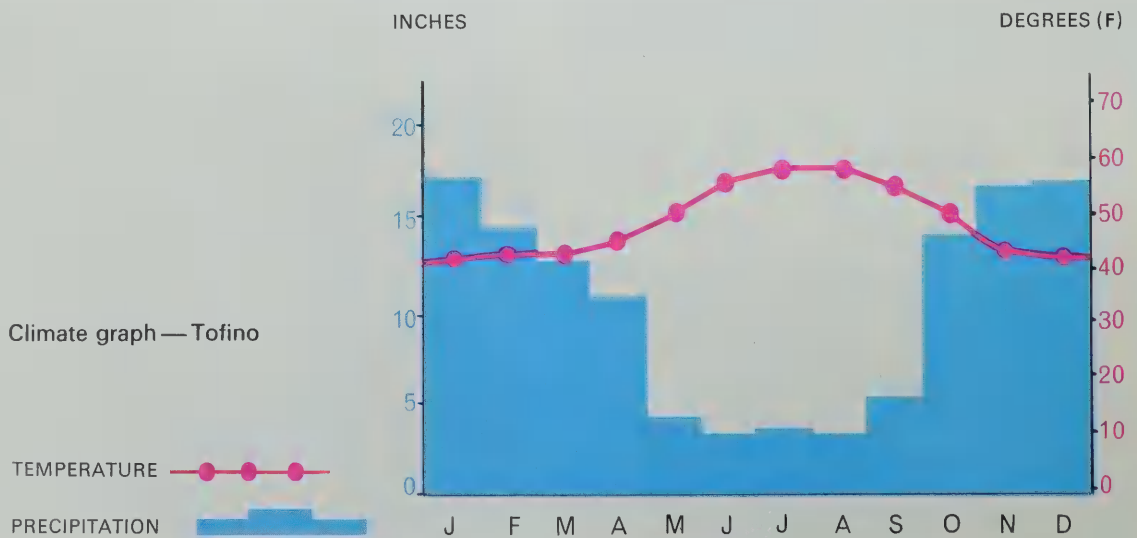
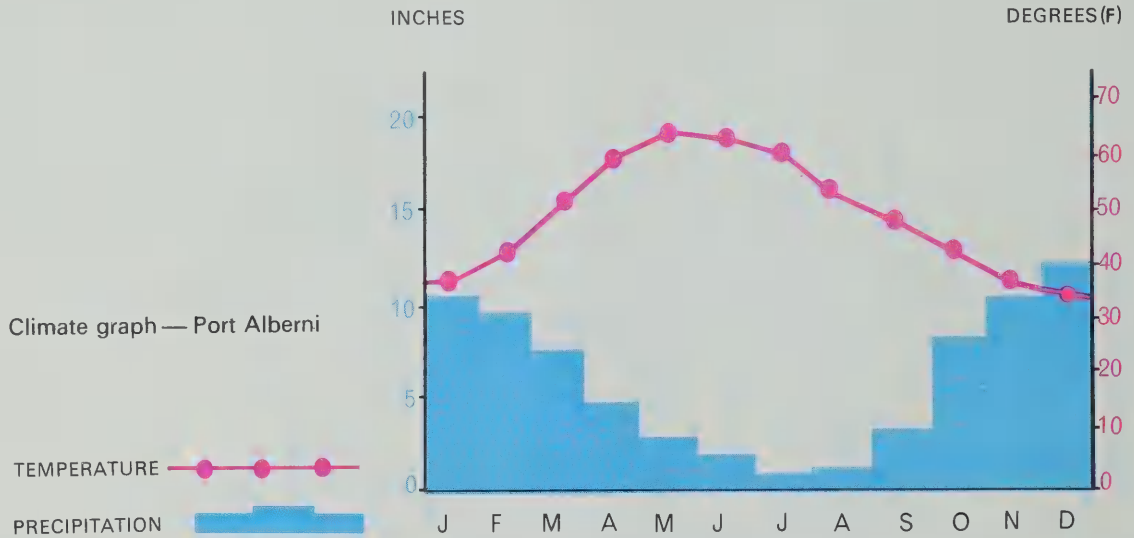


Men in "boom boats" sort logs by size, grade, and species. What advantages are there to performing this operation while the logs are still in the water?

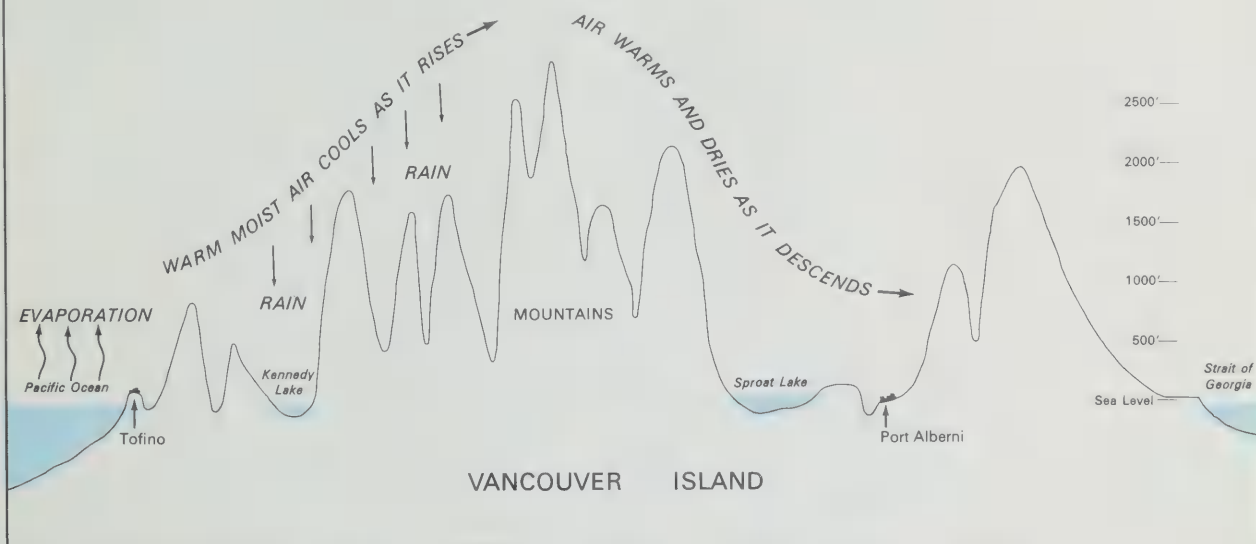
What activity is being performed aboard the "Havkatt"? What is the tug doing?



Port Alberni— Climate and Location

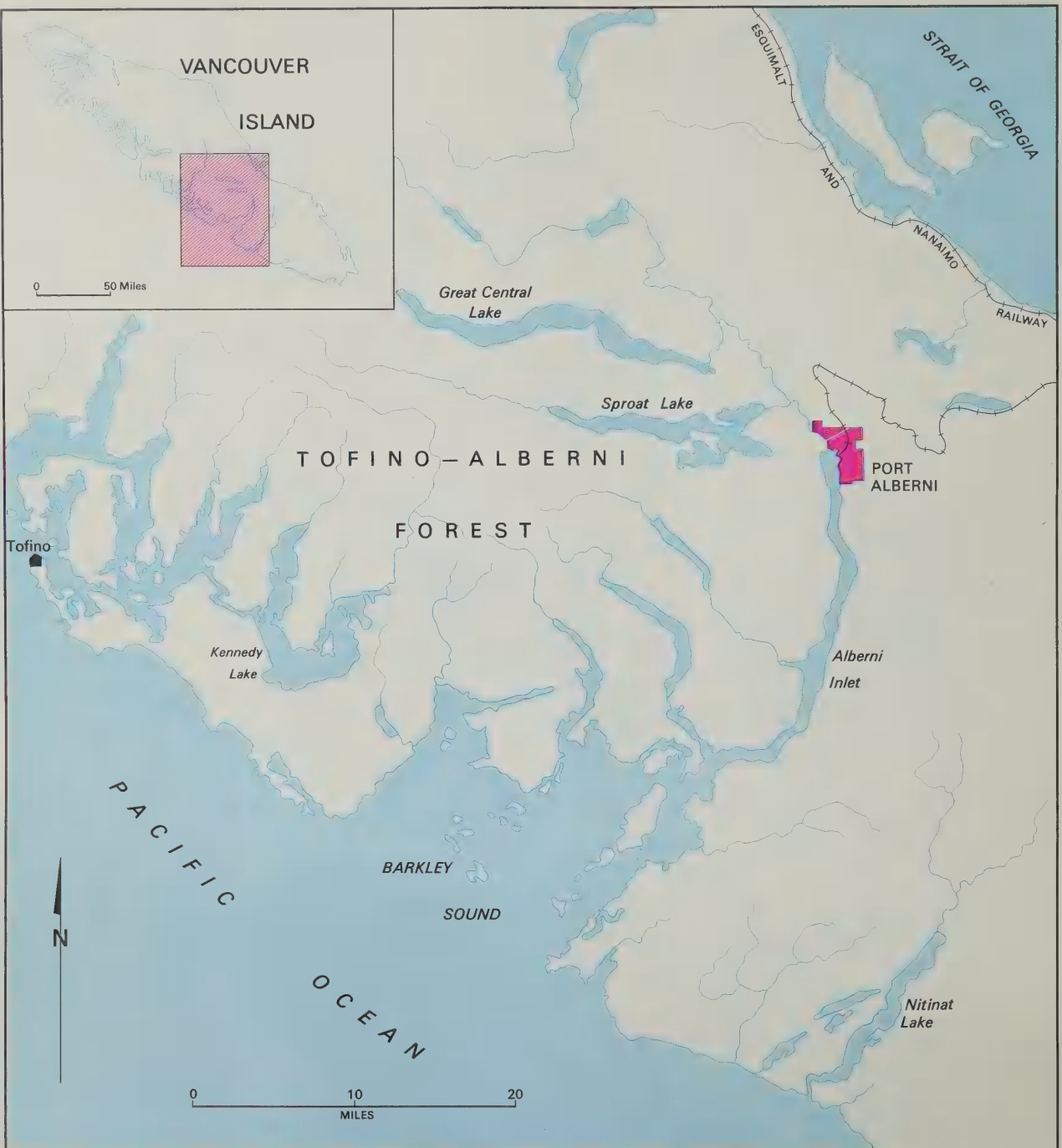


CONDENSATION OCCURS AS MOIST AIR RISES TO PASS OVER MOUNTAIN



DO

1. Describe the relief of Vancouver Island.
2. Air that passes over large bodies of water becomes moist as water evaporates into the air. In which direction is the air moving that affects Vancouver Island? Would this air be dry or moist?
3. Warm air is able to retain more moisture than cold air. If warm air rises to a high altitude, it becomes colder. Why must the air from the ocean rise to a higher altitude when it reaches Vancouver Island? What happens as the air becomes cooler?
4. What is the annual rainfall at Tofino? at Port Alberni? Why does one location receive more rain than the other?
5. The *range of temperature* is the number of degrees difference between the highest temperature and the lowest temperature. What is the range of temperature at Tofino? How would this range be different if there were no body of water nearby?
6. Describe the weather of a typical summer day in Port Alberni. Compare it with the weather of a typical winter day.
7. What are the main features of the climate of Vancouver Island? Relate these climate features to what you have learned so far about the forest industry.



DO

1. Describe the western coastline of Vancouver Island. What advantages and disadvantages does it have for the forest industry?
2. Alberni Inlet is a *fiord*. This long, narrow inlet has depths of water usually found only in the open sea.

- Why might this inlet and others along the coast be described as "highways."
3. Why are there few railways on Vancouver Island?
4. Is Port Alberni in a favorable location for a forest products manufacturing center?



- 1 Port Alberni
- 2 Pulp and Paper Mill
- 3 Pulp and Paper Dock
- 4 Sawmill and Shingle Mill

- 5 Sawmill
- 6 Plywood Division
- 7 Alberni Inlet
- 8 Booming Grounds

Lumber

The logs enter the sawmill on a *chain conveyor* after they have been scaled, that is, measured for the total number of board feet.

A board foot is a volume measurement 1 foot long by 1 foot wide by 1 inch thick. In a typical year, the various mills at Port Alberni receive logs containing 650 million board feet of wood. If this were all converted to lumber, it would cover a 4-lane highway between Vancouver and Toronto to a depth of 2 inches.

Once inside the mill, the wood goes to a barking chamber, where a *hydraulic barker* using a stream of water under great pressure removes the bark from each log.

When the barker has done its work, the clean log is transferred to the log deck and

is clamped on to a movable carriage. The logs are then sliced lengthwise by a giant band saw called the *head saw*. The skilled operator of this machine must decide exactly how each log should be cut in order to yield the greatest amount of high grade lumber.

Each slab removed by the head saw must be edged square and then cut into a number of desirable widths by a *gang saw*, a series of adjustable circular saws set in line.

Smaller timbers may go immediately to the gang saw to be cut into boards without first being placed on the head saw.

The cut lumber is moved to a sorting platform where it is carefully graded, counted, and marked according to size and kind.

The wood is very wet and heavy when cut into lumber. How many different operations take place in water before the log becomes lumber? Apart from weight, what other objection is there to wet wood?

A hydraulic barker at work. Why is the bark removed? To what use could the bark be put?



A head saw removes the curved slab from a log. What will the next slice look like?



Some of the lumber is kiln dried in a heated room where high temperatures are maintained for several days.

Lumber of a size that requires no further sawing process is put through a planer that smooths the four sides. Lumber that is to be further processed by the customer is shipped in the rough sawn shape.

DO

Try to visit a local lumber yard to learn more about lumber and its uses in your community. Prepare a report on the various sizes of lumber and prices. Discover what lumber is obtained from British Columbia. Find out what the following woods are usually used for: fir, pine, cedar, spruce.

Transporting the lumber

The company has found that in order to give its customers fast service, no time must be wasted in handling the finished lumber. Yet the lumber must be treated with care in order that it may arrive at its destination in good condition—and this may be after a voyage of several weeks on rough seas.

Lumber used to be loaded board by board on to the ships that docked at Port Alberni. Why would this be an expensive method of loading a ship? Today wood is bundled together with steel tapes. Each bundle contains pieces of exactly the same size in order to make the task of loading easier and faster.

Packaged loads ensure fast mechanical handling and safe, compact stowage. Why is it possible to pile lumber on the deck of this ship?



Plywood

Douglas fir logs of suitable grade and 18 inches or more in diameter go to the plywood mill.

Plywood is made from thin sheets of wood called *veneers*. After the log is barked, it is placed in a veneer peeler, a lathelike machine which rotates the log, pressing it against a very sharp blade. The blade peels off a continuous layer of veneer about 1/16th inch thick.

These sheets of veneer are given a coating of glue, and then stacked so that the wood grains of adjoining layers lie at right angles to each other. Presses squeeze the veneers together with heat and pressure.

Can you suggest why there would be less waste in the manufacture of plywood than in the manufacture of lumber?

DO

Examine various thicknesses of plywood. How many layers of veneer does each contain? What various types of plywood are available? What advantages does plywood have over lumber?

Pulp and Paper

Low grade logs from the forest and the waste wood from the plywood and lumber mills are the raw materials for the pulp and paper mill.

There are two methods of making pulp. In the *mechanical*, or *groundwood method*, logs are ground by large revolving grinders. The pulp that results does not make a strong paper because its fibers are short, and for this reason it is mixed with long-fibered *chemical pulp*.

To make chemical pulp, the wood is chipped, not ground. The chips are then cooked in chemicals that dissolve the *lignin*, the natural glue that holds together the valuable fibers. The result is chemical pulp.

To make newsprint (the paper on which newspapers are printed), chemical and groundwood pulp are blended together and spread thinly on a draining screen called a *fourdrinier*. The fourdriniers are continually moving into the paper-making machine where the drained pulp, now looking like thin wet felt, is fed through a drying section.

Paper making has become one of the world's fastest manufacturing processes. It

A modern newsprint machine costs about 10 million dollars. The development of a new pulp mill requires more than 80 million dollars. Why are there so few men in the picture?





The sawyer cuts tapered shingles at the automatic saw to his left. He trims the edges from the blanks on the circular saw in front of him, grades the finished shingles, and drops them into the appropriate chute to the packer below.

takes only ten seconds from the time the blended pulp moves on to the fourdrinier until the finished newsprint comes rushing out of the other end of the machine at the rate of half a mile a minute.

Some of the chemical pulp is processed into dried sheets of pulp. This partly processed material can be shipped to other countries which produce various kinds of paper in their own paper-making factories.

Other machines in this mill make paper for cartons and brown paper bags.

DO

Obtain sheets of newspaper for your classroom. Test them for qualities of strength, water absorption, resistance to sunlight. Are these qualities advantages or disadvantages in a newspaper?

Shingles

The shingle mill at Port Alberni produces each year enough cedar shingles to roof 13,000 homes. Why is cedar used for this purpose?

As you can see from the photograph of a *shingle sawyer* at work, each shingle requires an individual hand operation. How would this affect the price of cedar shingles?

DO

1. Telephone poles are made of cedar. What other uses of cedar do you know of?
 2. The following words can be associated with the forest industry. Identify the operation to which each word refers: *gang saw, groundwood, hydraulic barker, fourdrinier, chain conveyor, veneer, head saw, lignin.*
 3. Large amounts of water are needed in the various mill operations. From where might Port Alberni obtain much of its water?
-

Managing the Forests

Demand led to efficiency

There were small logging camps on the British Columbia coast around 1866, but it was not until after 1900 that the great boom in logging began. During the first thirty years of this century, the demand for forest products steadily increased, resulting in a more rapid cutting down of trees, not only on the west coast of Vancouver Island where the Tofino-Alberni forest is located, but throughout all forest land in British Columbia.

It became apparent to thoughtful men that young trees were not growing quickly enough to replace the mature ones being cut at an ever faster rate. It was known that parts of Western Europe and Asia, densely wooded less than two hundred years ago, had gradually been deforested. Vancouver Island forests were threatened, since they had been among the earliest areas logged. English, Spanish, and Russian explorers are believed to have cut timber on the shores of Alberni Inlet as long as 250 years ago.

In the 1930's the provincial government of British Columbia took stock of the timber resources, and made these frightening predictions: If the rate of cutting were to continue, none of the important kinds of trees would last more than 100 years, and the Douglas fir, the mainstay of the industry, would be gone in about 30 years.

To combat the danger, the government and private industry recommended a program of *sustained yield* cutting: The volume of wood cut in any one year must not be greater than the volume of new wood growth in that same year.

These recommendations made the whole forest industry realize the need to *manage* the forest resources.

Tree Farming

Tree farm licences

Today the forests are no longer mined for the precious resources they contain; rather they are farmed in such a way as to ensure a continuous crop. The government issues, to responsible companies, leases on government land known as Tree Farm Licences. In return for the exclusive right to utilize the wood from a specific area of land, the company adds to the Licence any adjacent timberland it owns and agrees to manage and protect the total area under government supervision. The government estimates the value of the standing timber on the government land within the Licence, and sets a price, known as *Stumpage*, that the company must pay for the timber as it is harvested, along with other taxes and fees.

TFL #20 and #21, TOFINO-ALBERNI are examples of Tree Farm Licences. The licensed company is permitted to harvest nearly a million acres of forest in the vicinity of Alberni Inlet, about one-half owned by the government and one-half owned by the company. When the licence was granted in 1955, there were about 6 billion cubic feet of mature timber in the area. (Why are cubic feet rather than board feet used to measure large quantities?) The company will be allowed to cut about 77 million cubic feet a year. This is the volume, which, according to the estimates of the foresters, will be replaced by new growth in the same year.

The granting of Tree Farm Licences was of the utmost importance. For it was only



A steam locomotive helps push logs into booming grounds.

with the assurance of a continuous supply of wood that the company could afford to develop a scientific program of forest renewal and to build mills equipped to make the fullest possible use of the wood resources.

Old ways, new ways

During the late nineteenth century, logging was done without mechanical equipment. Logs were cut with hand saws, and horses or oxen were used to drag them to the water.

By the turn of the century, engines powered by steam hauled logs from the forests. Instead of horses and oxen, steam locomotives were used to transport logs. Then in the 1930's truck logging began to replace railroad logging.

In the last 20 years, chain saws, diesel loaders, and portable spars have transformed the logging scene.

Until the 1940's logging was a seasonal activity. Can you suggest why logging was not done in seasons other than spring or fall? What reasons would explain the lack of winter logging? What danger would there be to mid-summer logging? In order to harvest as much of the timber crop as possible, the forest industry developed the *log high, log low system* that made logging into a year-round occupation. By this method areas in the higher, cooler altitudes are logged in summer, when the forests are free of snow but not a fire hazard. Winter logging is done in the lower elevations, where steep grades are absent, and where roads can be kept open. Other areas are logged in spring and fall. Since modern logging equipment is easily movable, it is possible to shift the crews throughout the Tofino-Alberni forest on short notice.

Ensuring a continuous crop

Like any other farmer, the company must plant a new crop each year to make sure that its land will remain productive, and since trees, unlike the usual farm crops, take 80 to 90 years to mature, the company must have a long-range harvesting program.

New planting may be done in two ways. The most common method is to replant a logged area with young trees, to the average

25 million 2-year-old seedlings are taken annually from British Columbia Forest Service seed beds and transplanted in logged areas. These are the start of new forests which will be managed to yield up to 40% more useable wood than that produced by untended natural growth.



of 400 to the acre. A second method is *patch logging*, that is, logging in such a way as to leave sufficient trees surrounding the area for natural reforestation to take place. Normally it takes five to ten years for a logged over area to reseed satisfactorily by natural processes. How does the planting of seedlings speed up growing time?

Just as a gardener thins his carrots to produce bigger and healthier vegetables, the forest company thins areas of congested growth. In juvenile stands where trees have become established too thickly, some that are crowding others are thinned out to give the stronger specimens more space. Some of the trees removed will be sold as Christmas trees.

In older forests, 30 to 40 years old, trees which have been suppressed by their more vigorous neighbors will be thinned out and used as pulp wood. The still growing healthy trees, at the end of the 80 to 90 year cycle, will produce more timber than would the original stand had it not been thinned.

DO

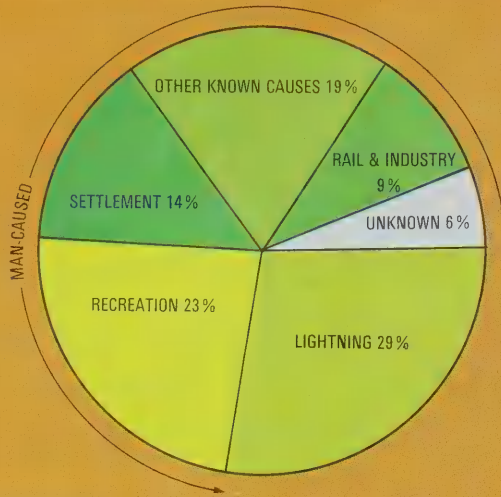
1. Suggest how replanting of an area, control of insect pests, and careful selection of seeds help increase the yield of wood per acre. Why would the forest company want to ensure a continuous supply of raw materials?
 2. Explain ways in which managed forests can produce a greater volume of wood than unmanaged forests.
 3. If seeds of a Douglas fir tree were to be planted to produce seedling trees, what properties should the "parent tree" have?
 4. What does the slogan "Trees for Tomorrow" mean?
-

Estimate the age of the plantation of Douglas fir in the foreground. Do you think the trees should be thinned?

This photograph shows stages in managed logging. Hand-planted trees grow in old logged area in foreground. Recently logged area is on sidehill. Unharvested timber is shown on hilltop. Why would the loggers not cut all the timber on the hillside at the same time?



Guarding against losses



An average of nearly \$13 million is lost each year through forest fires in Canada. The cost of protection in one year may be as high as \$35 million. Can you think of ways to prevent forest fires?

While the company is searching for better ways to harvest its tree farm, it also carries on a fight against insect infestation and fire, the two main threats to healthy tree life.

In company, government, and university laboratories, men are working to control tree diseases and insect pests.

But the greatest destroyer of growing timber is fire. During the summer months the danger of forest fires is at its peak. Can you suggest why this is so?

The company takes all possible care to prevent loss of timber by fire. Climate conditions are watched carefully at weather stations in logging areas, where sticks of wood are weighed frequently to determine the moisture content of forest litter. Extensive mobile fire equipment is kept in readiness, and crews are highly trained in fighting forest fires. Regular aerial fire spotting patrols enable quick reporting of fires.

A recent development is the use of water

Explain why the water bomber is particularly effective in the Port Alberni area.



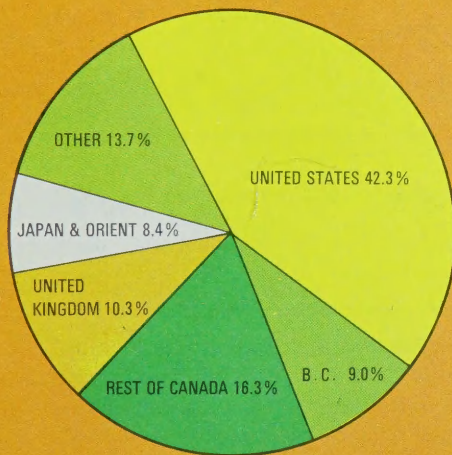
bombers in fighting fires. A converted Martin Mars transport plane, such as the one shown in the photograph below, skims across Sproat Lake, or any body of water, and in 22 seconds fills its 6000 gallon capacity water tanks.

But no matter how excellent the fire fighting equipment, it is better to prevent fires than to put them out. The company conducts an education program for loggers, tourists, and others who travel in the forests.

DO

1. Special areas are set aside as "emergency areas" for logging during the period of "high hazard" in the summer. Why would such areas be necessary? What kind of area would foresters choose for an emergency area? What conditions would be necessary?
2. Make a list of the ways the forest industry is practising conservation.
3. How can campers and hikers help in forest conservation?

Markets



In 1966 the Council of the Forest Industries of British Columbia estimated the total gross sales value of B.C. forest products at \$1100 million. This graph shows the distribution of company-wide sales for the Port Alberni forest industry company in the same year.

DO

1. On a globe, find the sea route taken by a ship transporting plywood to Japan. Find the sea route of a ship taking lumber to the United Kingdom. How many miles is it from Port Alberni to Tokyo, Japan? to Liverpool, England?

2. What might Japan export to Canada? What are some of the products Canada imports from the United Kingdom?

3. Why is it essential for Canadian forest industry companies to find markets abroad for their products?

Other Forest 1



This map shows the locations of some of the major forest industries in Canada.

DO

1. List the natural factors and the man-made factors that have led to the development of a forest industry at Port Alberni.
2. Review the conditions necessary to the growth of trees. What regions of Canada have few or no trees? Why?
3. The value of British Columbia's lumber output exceeds that of the pulp and paper output. The opposite is true of Newfoundland. What difference in forest growth might account for this?
4. Why does Vancouver Island require different kinds of logging equipment from that needed in the Eastern provinces?
5. What advantages does a forest industry company on the coast have over an inland forest industry company?
6. There is still a great deal of Canada's forest land to be put to use. What factors encourage or hinder the development of forest resources?

Credits

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